

W O XCODE No
19509

USER HANDBOOK

METER, CONTAMINATION No.1. OR No.1. MK. 2. EQUIPMENT

Provisional Edition

1954

(Reprinted Oct, 1960 to include
Addendum and Amendment No. 5)

Prepared and Printed by:-
Ministry of Aviation, Electrical Inspection Directorate,
"Aquila", Golf Road, Bromley, Kent.

USER HANDBOOK
FOR
METER, CONTAMINATION, No.1.
(J.S.C. No. 6665 - 110012)
OR
No.1. MK. 2. EQUIPMENT
(J.S.C. No. 6665 - 110107)

HAVERSACK ASSEMBLY, SPECIAL No. 1
(J.S.C. No. 6665-110035)

SCREWDRIVER, SPK (AL.
2" x 1 1/8" x 17/64" TIP
(J.S.C. No. 5120-100000)

INDICATING UNIT No. 1
(J.S.C. No. 6665-110034)

PROBE UNIT, BETA-GAMMA,
ASSEMBLY No. 1
(J.S.C. No. 6665-110033)

CONNECTOR ASSEMBLY No. 1
(J.S.C. No. 5995-400036)

METER CONTAMINATION No. 1
(J.S.C. No. 6665-110012)

RAVERSACK ASSEMBLY, SPECIAL No. 1 MK.2
(U.S.C. No. 6665-110127)

SCREWDRIVER, SPECIAL,
2" x 1-1/8" x 17/64" TIP
(U.S.C. No. S120-100000)



PROBE UNIT, BETA-GAMMA,
ASSEMBLY No.1 MK.2
(U.S.C. No. 6665-110110)

INDICATING UNIT No.1 MK.2
(U.S.C. No. 6665-110108)

CONNECTOR ASSEMBLY No.1 MK.2
(U.S.C. No. 6665-110109)

METER CONTAMINATION No.1 MK.2 EQUIPMENT
(U.S.C. No. 6665-110107)

CONTENTS

CHAPTER ONE - GENERAL DESCRIPTION

PURPOSE	...	...	...	...	...	page	5
ADDITIONAL FACILITIES	...	...	...	...	...	"	5
GENERAL CONSTRUCTION	...	...	...	...	...	"	6
POWER SUPPLIES	...	...	...	...	...	"	8
DIMENSIONS	...	...	...	...	...	"	8
WEIGHTS	...	...	...	...	...	"	8
DETAILS OF CONTROLS	...	...	...	...	...	"	10

CHAPTER TWO - PREPARATION FOR USE

FITTING THE SUPPLY UNITS	...	...	...	...	...	"	12
(a) Operation from 150V. Batteries	...	...	...	...	...	"	12
(b) Operation from Power Unit, Vibrator No.1	...	...	...	...	...	"	13
(c) Operation from Power Unit, Mains No.1	...	...	...	...	...	"	14
SETTING UP	...	...	...	...	...	"	15
POWER SUPPLY CHECK	...	...	...	...	...	"	16
FUNCTIONAL CHECK	...	...	...	...	...	"	17

CHAPTER THREE - OPERATION

USE	...	...	...	...	...	"	18
CARE	...	...	...	...	...	"	20
APPENDIX A GEIGER-MULLER TUBES	...	...	...	...	...	"	22
APPENDIX B BATTERIES	...	...	...	...	...	"	24

CHAPTER ONE

GENERAL DESCRIPTION

PURPOSE

The Meters, Contamination No.1 and No.1 Mk.2 are portable instruments used for locating and measuring radio-active contamination of personnel, food, clothing etc.

They will detect and measure contamination producing gamma radiation from 0 to 10.0 milli-Roengtens per hour.

Meters, Contamination No.1 and No.1 Mk.2 are functionally similar and almost identical physically; the Mk.2 version has, however, moulded rubber plugs and sockets and a moulded rubber connector.

ADDITIONAL FACILITIES

With a special 'Water G.M. Tube' CV 2886 fitted, the instruments can be used for detecting the beta radiation of contaminated liquids.

Provision is made for earphones to be plugged into the instrument to give aural indication of contamination, but these are not normally provided with the equipment.

GENERAL CONSTRUCTION

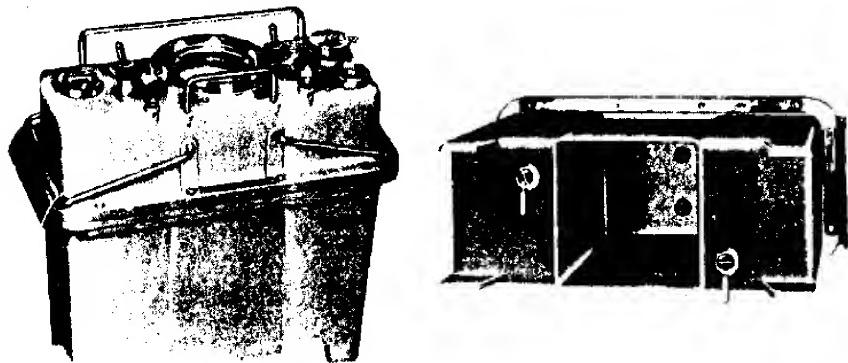
Each instrument consists of two units housed, for carrying purposes, in a haversack - one is the Probe Unit and the other is the Indicating Unit. For interconnection, a six-foot flexible connector is provided which is also stored in the haversack when the instruments are not in use.





The case of the Probe Unit is of cast metal construction with carrying handle. On the top of the case is mounted the Geiger-Muller tube and a valve cover. A hook fitted to the carrying handle allows the Probe Unit to hang from the haversack or other convenient point. This facility enables the instruments to be used whilst being carried.

The case of the Indicating Unit is also of cast metal construction; with the controls, meter and folding carrying handles on the top. It also contains the power supply compartment which is accessible from the underside of the unit.



The two units are hermetically sealed; only the interior of the power supply compartment being accessible to the operator. All plugs and sockets are of the sealed type. The Indicating Unit is fitted with a Humidity Indicator which incorporates a replaceable Desiccator Unit.

POWER SUPPLIES

Supply units are not provided with the instrument because three units are available as separate alternatives for insertion into the power supply compartment. These are:-

- (a) Battery Holder No.1 (J.S.C. No. 6665-110020)
housing two 150V. batteries,
- or (b) Power Unit, Vibrator No.1 (J.S.C. No. 6665-110029) operating from four 1.35V. cells,
- or (c) Power Unit, Mains No.1 (J.S.C. No. 6665-110028) operating from A.C. Mains 100-120V.
or 200-250V., 40-60 c/s.

The two power units are hermetically sealed and fitted with Humidity Indicator, which incorporates a replaceable Desiccator Unit.

NOTE: Equipments issued to the Army will use only the 150V. batteries.

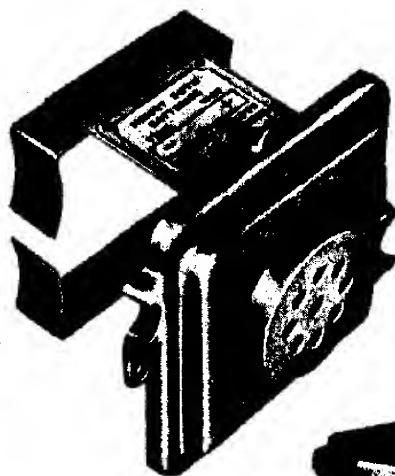
DIMENSIONS

Dimensions of the haversack with equipment housed:-

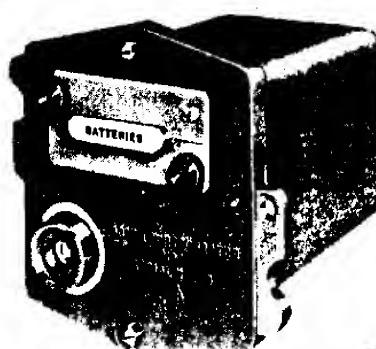
Length ...	...	...	...	30 in
Width ...	...	...	...	7 in
Height ...	...	...	...	11 in

WEIGHTS

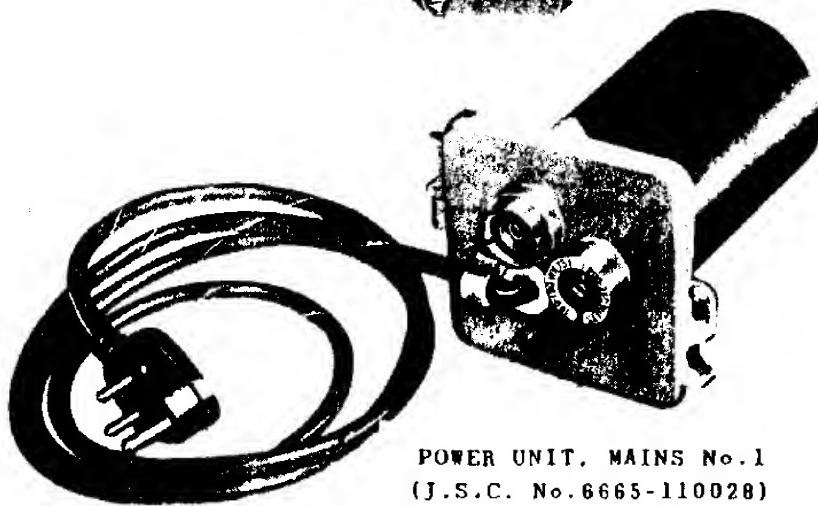
Meters, Contamination No.1 or No.1 Mk.2 (complete in haversack, less supply unit)	approx 14 lb
Battery Holder No. 1 (complete with two 150V. batteries)	" 2.1 lb
Power Unit Vibrator Unit No. 1 (complete with four 1.35V. cells)	" 2.1 lb
Power Unit, Mains No. 1	" 3.1 lb



BATTERY HOLDER No.1
(J.S.C. No.6665-110030)



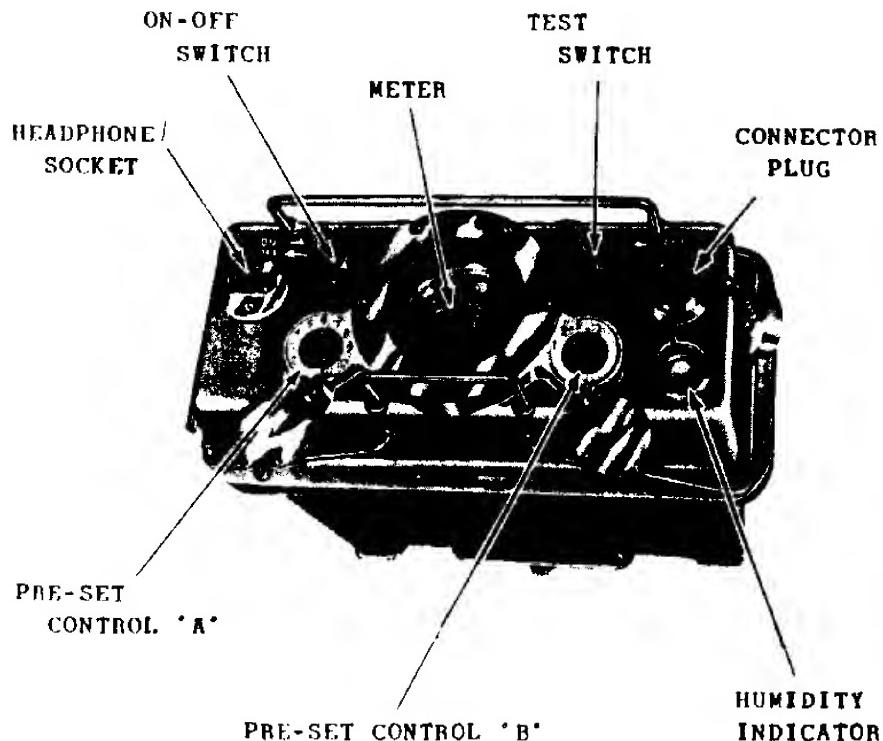
POWER UNIT.
VIBRATOR No.1
(J.S.C. No.6665
-110029)



POWER UNIT. MAINS No.1
(J.S.C. No.6665-110028)

DETAILS OF CONTROLS

Control	Function
HEADPHONE SOCKET	Moulded rubber socket for connecting headphones for use as an aural indication of contamination. Suitable headphones - Receivers, Headgear, I.T.E. No. 1B, J.S.C. No. 5965-400046.
ON-OFF SWITCH	For switching on the power supplies to the instrument.
METER	Indicates in milli-roengtens per hour the amount of radiation being detected by the G.M. tube in the Probe Unit. Also used to indicate the state of the power supply in use, when the TEST SWITCH is operated.
TEST SWITCH	A spring-loaded switch, biased in the 'Off' position, used for checking the state of the power supplies to the instrument.
CONNECTOR PLUG	Accommodates the socket of the connector to the Probe Unit. Fitted with a cover which should be replaced when the connector socket is removed.
PRE-SET CONTROL 'A'	A slide-over cover reveals an eleven-position switch used for setting the voltage applied to the G.M. tube when initially setting up the equipment for use. THIS CONTROL SHOULD ONLY BE ALTERED BY SUITABLY QUALIFIED PERSONNEL, (SEE APPENDIX A)



Details of Controls (cont'd)

Control	Function
PRE-SET CONTROL 'B'	A slide-over cover reveals a three-position switch used for adjusting the power supply voltage to the instrument. THIS CONTROL SHOULD ONLY BE ALTERED IF OPERATION OF THE TEST SWITCH PRODUCES A READING ON THE METER OUTSIDE THE 'TEST' REGION.
HUMIDITY INDICATOR	The colour changes from blue to pink when there is dampness present inside the Indicating Unit. Also incorporates the Desiccator unit which is replaceable, BUT ONLY IN PROPERLY-EQUIPPED WORKSHOPS.

CHAPTER TWO

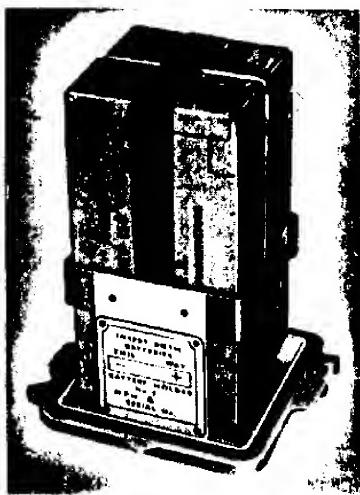
PREPARATION FOR USE

FITTING THE SUPPLY UNITS

Having obtained the appropriate supply unit for the power supply to be used, it should be fitted as detailed below.

(a) Operation from 150-Volt batteries

Battery Holder No.1 houses two 150 V. batteries, details of which will be found in Appendix B.



Insert the Battery Holder complete with batteries into the power supply compartment on the underside of the Indicating Unit, ensuring that the locating pin on the base of the Indicating Unit enters the location hole in the flange of the Battery Holder, and the four pins inside the power supply compartment enter the sockets on the batteries.

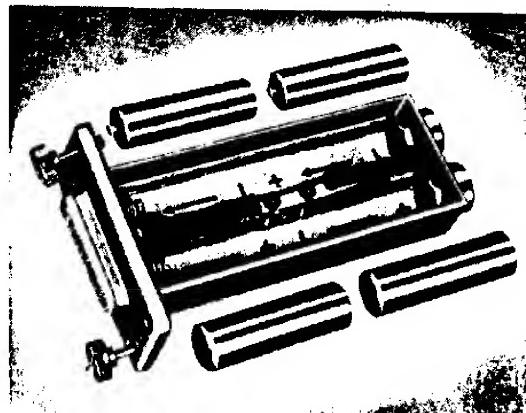
Rotate the two clamps until the Battery Holder can be pushed fully home, then again rotate these clamps to hold the Battery Holder in position.

(b) Operation from Power Unit Vibrator No.1

This unit uses four 1.35V, cells which are fitted in the drawer marked 'Batteries'. Details of these cells will be found in Appendix B.

To fit these cells proceed as follows:

Loosen the two captive screws of the tray in the Vibrator Unit marked 'Batteries' and withdraw the tray. *Turn the two clamping strips carefully to their longitudinal positions in the tray. Insert the four 1.35V, cells as marked on the tray -the brass end cap is the '+' terminal.



Whilst holding down the cells, carefully rotate the clamping strip to hold them in position.

Replace the tray into the Vibrator Unit and tighten its fixing screws.

Insert the Vibrator Unit complete into the power supply compartment on the underside of the Indicating Unit, ensuring that the locating pin on the base of the Indicating Unit enters the location hole in the flange of the Vibrator Unit, and the four pins inside the power supply compartment enter the sockets at the rear of the Vibrator Unit.

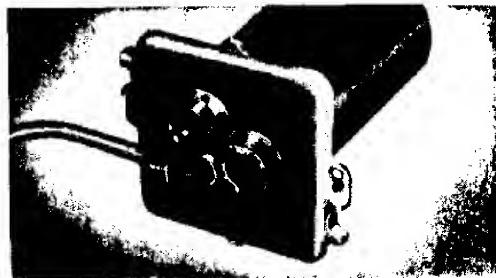
Rotate the two clamps until the Vibrator Unit can be pushed fully home, then again rotate these clamps to hold the Vibrator Unit in position.

* The two captive screws must be loosened fully before attempting to withdraw the tray. Failure to do this may result in damage to the threads when the tray is withdrawn.

(c) Operation from Power Unit Mains No. 1

Ascertain the voltage of the mains power supply to be used, and also check that it is an A.C. source having a frequency between 40 and 60 cycles per second.

With the screwdriver provided, adjust the MAINS TAP SWITCH on the Mains Unit to the appropriate setting for the mains supply voltage.



Insert the Mains Unit into the power supply compartment on the underside of the Indicating Unit, ensuring that the locating pin on the base of the Indicating Unit enters the location hole in the flange of the Mains Unit, and the four pins inside the power supply compartment enter the sockets at the rear of the Mains Unit.

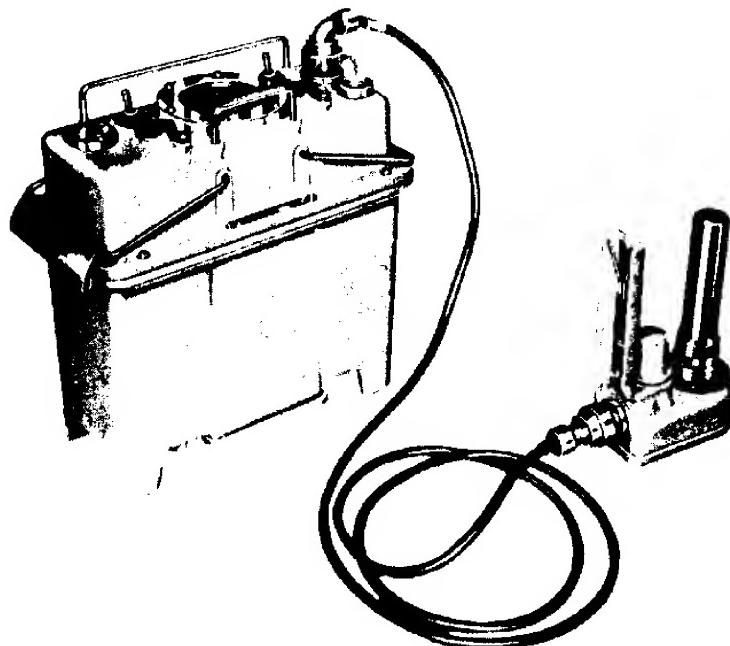
Rotate the two clamps until the Mains Unit can be pushed fully home, then rotate these clamps to hold the Mains Unit in position.

Switch off the mains power supply source and insert the mains plug of the Unit into a convenient 5-amp 3-pin mains supply socket. If the mains supply socket is not suitable for the 5-amp 3-pin plug, disconnect the latter from the mains lead and fit an appropriate plug, which may have to be obtained locally.

Switch on the mains power supply source.

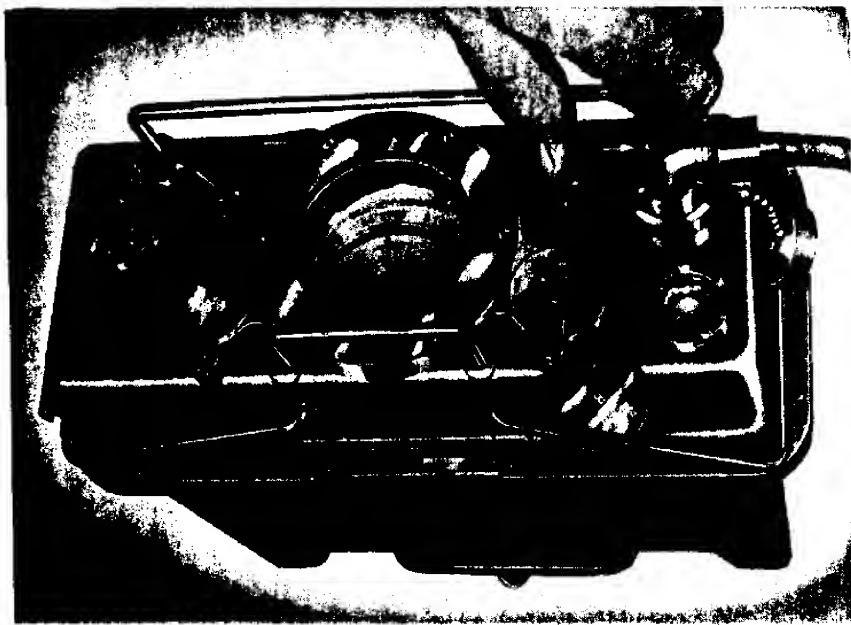
SETTING UP

1. Remove the two units and the connector from the haversack.
2. Ensure that the appropriate power supply unit is fitted into the underside of the Indicating Unit (see page 12 'Fitting the Supply Units').
3. Remove the dust cover of the plug on the Indicator Unit.
4. Connect the Probe Unit to the Indicator Unit using the six-foot connector provided. On instruments having moulded rubber plugs and sockets, the rubber pips on each part must be aligned before insertion. On instruments having metal cased plugs and sockets, screw home the clamping rings on the connector.



5. Replace the Indicating Unit into the haversack if the instrument is to be operated whilst being carried.
6. If not already fitted, remove the G.M. tube from its packing, and insert it with its keyway correctly located in the 2-pin socket on the Probe Unit, ensuring that the flexible skirt of the G.M. tube is secured under the flange of the socket

POWER SUPPLY CHECK



Press the TEST SWITCH to the 'On' position, and whilst holding the switch pressed, check that the Meter pointer comes to rest within the region marked 'Test' on the Meter scale.

if no reading at all, check that the plug and

socket connections of the connector are firmly made. If the Mains Power Unit is being used, also check that the mains supply is switched on.

- if not reading within the 'Test' region, slide off the cover of PRE-SET CONTROL 'B' and using screwdriver provided, adjust the CONTROL 'B'. If meter indications cannot be brought up to the 'Test' region and 150 V. batteries or Vibrator Unit are being used, change the batteries (see appropriate paragraph under 'Fitting the Supply Units').

FUNCTIONAL CHECK

Set the ON/OFF SWITCH to 'On' and with the Probe Unit well removed from any known radio-active sources (including those to be investigated) slight 'kicks' of the Meter pointer should be observed. These are known as 'Background count' and as they are due to normal natural radio-activity, give an indication that the instrument is functioning. If a small radio-active source, such as a luminous-faced watch, is brought near to the Probe Unit, the reading will increase as the watch is brought nearer. This is a further check that the instrument is functioning satisfactorily.

- if the Meter pointer does not move, check G.M. tube voltage is correctly set as detailed in Appendix A.

If headphones are plugged into the HEADPHONE SOCKET, audible 'clicks' will be heard which will coincide with the 'kicks' of the Meter pointer.

CHAPTER THREE

OPERATION

USE

The Probe Unit of the instrument is used for detecting the existence of contamination and, for normal use, is placed at a distance of approximately 20 inches (50 cm) from the suspect personnel, food, clothing etc.

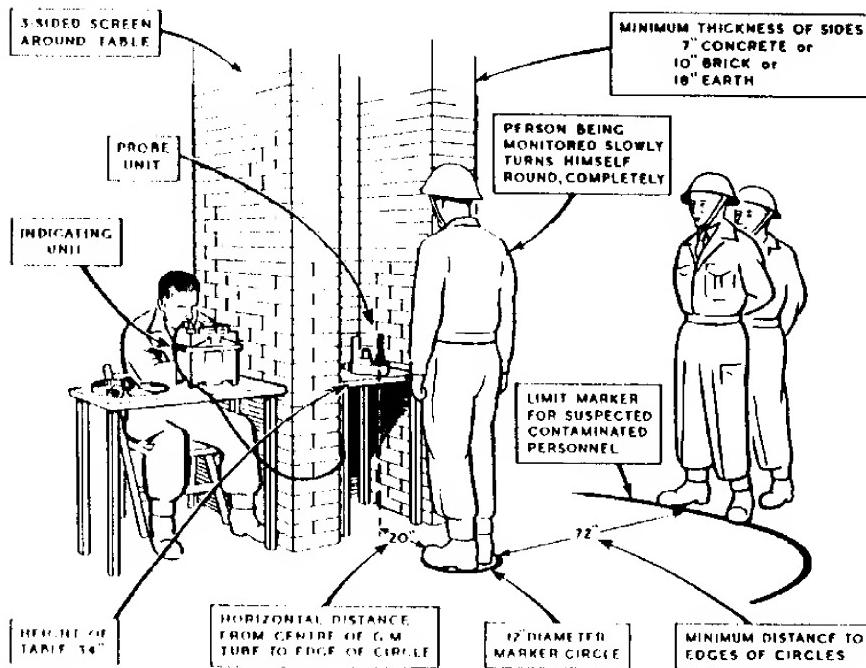


When checking water for contamination, a sample of the suspect water is poured into the specially-designed glass container surrounding the 'Water G.M. Tube' (CV2886).

When strong contamination of water is suspected, it will be desirable to dilute the suspect water with known proportions of uncontaminated water, in order that convenient meter readings can be obtained. This may also prevent the meter being damaged due to excessive reading.

As these instruments are very sensitive they will give a false reading of the suspect contamination if the Probe Unit is operated unshielded in an area of

general contamination. During use, action should be taken to ensure that the Probe Unit is adequately shielded from all radio-active sources other than that under investigation - the stronger the interfering source, the greater will be the shielding required. A suggested method for checking personnel is shewn below.



There will, however, be some 'kicks' of the Meter pointer due to normal natural radio-activity.

Before using the instrument to check contamination, place the Probe Unit in its operating position, with the suspect personnel, food, clothing, fluid etc. well removed.

Note the Meter reading obtained from the normal natural radio-activity and from any other interfering radio-active source, i.e. the 'Background Count'.

Before assessing the extent of contamination, the meter reading due to Background count must be deducted from the reading obtained from any suspect contamination.

CARE

1. The use of the instrument depends very largely upon the satisfactory operation of the G.M. tube. It must be handled with care, and must on no account be subject to rough usage. The G.M. tube for water contamination is very easily damaged, and must be handled with GREAT care.
2. Although the rest of the instrument is not so susceptible to damage, reasonable care must be taken when using it - for example, the flexible connector must not be subjected to excessive strain.
3. When contamination measurements are being made of personnel, food, clothing etc., under no circumstances should any part of the instrument, particularly the Probe Unit, come into direct contact with the suspect otherwise the instrument itself may become contaminated, and it will then have to be sent to a special decontamination centre.
4. For contamination measurements of liquids, great care must be taken to ensure that none of the suspect liquid is spilt on the Probe Unit. Immediately after use, the water G.M. tube should be decontaminated in accordance with local instructions.
5. When the Humidity Indicator in the Indicating Unit or Power Units turns pink in colour, the complete unit should be returned to workshops as soon as practicable

for the checking of hermetic sealing and the replacement of Humidity Indicator.

6. Under no circumstances should the operator remove the Humidity Indicator, or the Indicating or Power Units from their cast metal cases, as the hermetic seal would then be broken.
7. After use ALWAYS check that the ON/OFF SWITCH on the instrument is set to 'Off'.
8. When the instrument is using either the 150V. Batteries or Power Unit Vibrator No.1, and it is not in use for long periods, e.g. during storage, ALL BATTERIES SHOULD BE REMOVED TO PREVENT CORROSION.

APPENDICES

APPENDIX A GEIGER-MULLER TUBES

TYPES

For contamination measurements of personnel, food, clothing etc., types CV2246 or CV2247 are used.

For contamination measurements of liquids, type CV 2886 is used.

OPERATING VOLTAGE

The correct operating voltage for the G.M. tube varies with different tubes - even with tubes of the same type. It will also vary for the same tube with large differences in ambient temperature.

Consequently, PRE-SET CONTROL 'A' is fitted in the Meters, Contamination No. 1 and No.1 Mk.2 for adjustments to be made as required.

If, however, the setting of PRE-SET CONTROL 'A' has to be altered, the accuracy of calibration of the instrument MAY be affected. With different G.M. tubes of the same type, errors may occur up to 15%, whereas if a G.M. tube type CV2886 is substituted in an instrument set up for types CV2246 or CV2247 (or vice versa), errors up to 60% may occur. Therefore, as soon as practicable after a G.M. tube change, the instrument complete with G.M. tube should be returned to workshops for compensating adjustments to be made inside the instrument.

ADJUSTING PRE-SET CONTROL 'A'

THESE ADJUSTMENTS SHOULD ONLY BE MADE BY
SUITABLY QUALIFIED PERSONNEL.

1. With the instrument correctly set up as detailed in the Operating Instructions, place a small radioactive source, such as a luminous-faced watch, near the Probe Unit.
2. Slide off the cover of PRE-SET CONTROL 'A' and using the screwdriver provided, rotate the PRE-SET CONTROL 'A' fully anti-clockwise.
3. If there is no reading on the Meter of the Indicating Unit, rotate PRE-SET CONTROL 'A' clockwise step by step to the FIRST position where a reading is observed, then turn it clockwise FIVE positions.
4. If there is a reading on the Meter of the Indicating Unit, remove the source completely from the vicinity of the Probe Unit and then rotate the PRE-SET CONTROL 'A' in a clockwise direction step by step:
 - if a reading is observed at any setting of PRE-SET CONTROL 'A' with the source removed, this is due to the G.M. tube having low operating voltage characteristics and the PRE-SET CONTROL 'A' should be turned back (i.e. anti-clockwise) FIVE positions from that setting.
 - if a reading is not observed at any setting with the source removed, this is due to the G.M. tube having high operating voltage characteristics, and the PRE-SET CONTROL 'A' should be set at the position marked '5'.

FINAL CHECK

Check that a reading is obtained on Meter with the small radio-active source near the Probe Unit, and no reading when the source is removed.

Slide back the cover of PRE-SET CONTROL 'A'

APPENDIX B BATTERIES

Below are details of the batteries used for the Meter Contamination No.1 and No.1 Mk.2

Used in	Qty. Reqd.	Designation	JSC No.	Nearest Commercial Equivalent
BATTERY HOLDER No.1	2 off	BATTERIES DRY 150V. No. 1	6135- 101165	EVER-READY B 1365
POWER UNIT VIBRATOR No.1	4 off	BATTERIES DRY 1.35V. No. 1	6135- 101172	MALLORY RM 12 VIDOR VO 107 EVER-READY U 12

WORKING LIFE

BATTERIES DRY	150V. No.1	approx. 600 hours
" " "	1.35V. No.1	
MALLORY RM12	cell	" 120 "
VIDOR VO107	"	" 50 "
EVER-READY U12	"	" 20 "